

IDENTIFYING INDIVIDUAL LEOPARDS (PANTHERA PARDUS KOTIYA) IN SRI LANKA USING DEEP LEARNING

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Abstract

The Sri Lankan leopard, which is a critically endangered species, is essential to Sri Lanka's wildlife habitat. The identification of individual leopards is critical for developing conservation plans, allocating resources, prioritizing efforts, and evaluating the effectiveness of conservation programs. However, traditional methods for identifying leopards are time-consuming and require tagging a massive amount of images and videos before they can be used in ecological research.

The evolution of Computer Vision technology has emerged as a potent means for recognizing individual wild animals. The author develops an individual identification procedure with the body features (spots pattern) of Sri Lankan Leopard (*Panthera pardus kotiya*) built upon the deep Convolutional Neural Network (CNNs). The proposed system addresses the technological challenges associated with identifying individual leopards, thereby improving conservation plans for these animals.

This study presents a deep learning-based system that utilizes Convolutional Neural Networks to improve the accuracy of individual leopard identification, addressing the issue discussed above. Therefore, this proposed system aims to provide a more efficient and accurate approach to identifying Sri Lankan leopards (*Panthera Pardus Kotiya*). A prototype was developed using a pretrained VGG16 model and trained with approximately thousand images of Yala Individual leopards.

The proposed system employs digital photographs to efficiently identify individual leopards, reducing the time and effort needed for traditional identification methods. The validation dataset yielded an accuracy rate of 84%. However, to further enhance the model's accuracy, it is recommended to expand the dataset by including more Sri Lankan Leopards and capturing multiple images of each individual from various angles. Hyperparameter tuning is also advised to improve the model's stability. The proposed system could be invaluable in establishing effective conservation strategies and evaluating the effectiveness of conservation programs for Sri Lankan leopards.

Key Words: *Panthera pardus kotiya*, Spots, Individual identification, Wildlife conservation, Deep learning, Convolutional Neural Networks.